A variable amplitude noise generator circuit 35 is connected to receive an input signal from the output of RF portion 23. Variable amplitude noise generator 35 supplies a background noise signal to final audio stage 31 through a mixer 37. In this preferred embodiment mixer 37 is situated between audio amplifiers 29 and final audio stage 31 to mix the noise signal with the audio signal supplied by audio amplifiers 29 but it will be understood that the noise generated by variable amplitude noise generator 35 can be introduced into the channel anywhere in the audio portion. In this specific embodiment the noise in variable amplitude noise generator 35 is generated by a noise diode, which is a commercially available device. The noise can be generated by a random frequency generator or, if RF portion 23 contains low frequency signal components, such as IF beat signals, a generator as simple as a one transistor amplifier having a linear or some more complex response can be utilized. The amplifier may include several stages of amplification and response adjustments if these are desirable for a specific application.

In this preferred embodiment the background noise introduced into the audio portion is strongest when signals in the RF portion (received signals) are weakest and, as the signals in the RF portion gain in strength, the background noise signal is reduced. Thus, as receiver 12 (FIG. 1) is reoriented toward better reception of the transmitted signal, the amplitude of the background noise is reduced and the operator knows the receiver is being moved in the correct direction. Generally, it is desirable to insert a small amount of background noise even when a proper received signal is present. This background noise improves operator ambience by continually assuring the operator that the receiver is operating properly. For example, during relatively long breaks in a conversation the operator is assured of correct operation and does not wonder whether there has been a break in communications.

Referring to FIG. 3, a different embodiment of a digital receiver 40 is illustrated in simplified block form. Receiver 40 includes an antenna 42, an RF portion 44, a digital portion including a mixer 48 and a vocoder 50 and an audio portion including an audio amplifier 52, a final audio stage 54 and an audio transducer 56. In this specific embodiment a variable amplitude noise generator 60 is provided which supplies a digital noise signal through mixer 48 to vocoder 50. A second input of mixer 48 receives the output signal from RF portion 44, after it has been digitized. It will of course be understood that the digital output signal of variable amplitude noise generator 60 can be a signal that produces a constant tone, a periodically interrupted audio tone (e.g. a beep), etc. Thus, digital noise is mixed with the digital signal in the digital portion of receiver 40 to provide some background noise to improve operator ambience.

In this embodiment variable amplitude noise generator 60 is controlled by the output signal of RF portion 44 so that the amplitude of the background noise is reduced as signal strength increases, where signal strength is measured at the output of RF portion 44. It will be understood that control signals can be developed in other portions of the receiver, if desired, for example the output of an automatic gain control, but the amplitude of the RF signal is a natural and available control signal.

In some applications it may be desirable to have a constant background noise signal and a continuous control of the amplitude is not necessary. In such instances a simple noise generator is used in place of variable amplitude noise generator 35 (FIG. 2) or 60 (FIG. 3) and the control line from RF portion 23 (FIG. 2) or 45 (FIG. 3) is not implemented.

In many digital receivers the digital portion of the receiver includes a digital signal processor (DSP), which ultimately supplies signals to vocoder 50, or similar circuitry. The DSP may be a microprocessor with a program, custom integrated circuits, boards etc. In some instances the vocoder operation may also be performed in the DSP. This specific embodiment is illustrated in FIG. 4 wherein components similar to FIG. 3 are designated with a similar numeral and all numerals have a prime (') added to indicate a different embodiment. A DSP 47' is illustrated as including mixer 48', vocoder 50' and variable amplitude noise generator 60'. In receiver 40', the noise generator function is performed in DSP 47', which is programmed to generate or pass a small amount of digital noise to vocoder 50'.

Thus, an improved digital receiver is disclosed which includes a background noise generating circuit to improve the operator ambience of the receiver. During periods when signals are not being received the operator hears a normal background noise to assure the correct operation of the receiver. Further, in instances where the receiver includes a directional antenna or there are multiple propagation paths the operator uses the background noise to properly orient the receiver and antenna for good reception. Generally, the background noise is inserted with a minimum amount of change and expense to the receiver.

While I have shown and described specific embodiments of the present invention, further modifications and improvements will occur to those skilled in the art. I desire it to be understood, therefore, that this invention is not limited to the particular forms shown and I intend in the append claims to cover all modifications that do not depart from the spirit and scope of this invention.

What is claimed is:

1. In a digital receiver, apparatus for providing operation indicative background noise comprising:

a digital receiver including an RF portion, a digital portion and an audio portion, the digital portion being coupled to receive signals from the RF portion and provide the signals to the audio portion; and

a background noise generator having a background noise output coupled to one of the digital or the audio portions to provide background noise indicative of the operation of the receiver.

2. Apparatus as claimed in claim 1 wherein the background noise generator includes a variable amplitude output the amplitude of which is controlled by a control input, the control input being coupled to the RF portion of the receiver to control the amplitude of the background noise coupled to the receiver.

3. Apparatus as claimed in claim 1 including in addition an antenna coupled to the RF portion, the antenna supplying input RF signals with an increased amplitude as the antenna is generally oriented in a direction of increased signal strength from a transmitting source of the RF signals.

4. In a digital communication system, apparatus for providing operation indicative background noise comprising:

a digital receiver including an antenna, an RF portion connected to the antenna, a digital portion con-